Remarks

Claims 1-15 and 25-26 are pending.

Claims 18-21 and 27-28 are cancelled.

Claims 16-17, and 22-24 are withdrawn.

Claims 1-15 and 25-27 are rejected.

The rejections are traversed.

Examiner Interview

An interview was held on July 23, 2007 between the Examiner and Derek Meeker, an attorney for the Applicant. The interview included discussions on the combination of Kim and Wong. An agreement was reached in that Kim and Wong would not be combined.

Claim Rejections Under 35 USC § 112

Claim 27 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claim 27 has been cancelled.

Claim Rejections Under 35 USC § 103

The claims are rejected under 35 U.S.C. 103(a) as being unpatentable over various combinations of Halbert et al. (U.S. Patent Application Publication 2002/011219), Kim (U.S. Patent Application Publication 2003/0174544), Wong et al. (U.S. Patent 5,239,561), Little et al. (U.S. Patent 6,038,655), Boggs et al. (U.S. Patent 5,530,696), Gray (U.S. Patent Application Publication 2002/0083286), and the applicants admitted prior art (AAPA).

In a prior office action dated January 12, 2007, the Examiner indicated that the dependent claim including the element where the achieved data transition density is "calculated over greater than two clock cycles." The independent claims were amended to include this element.

The Examiner performed a new search resulting in the pending office action. In particular, the Examiner included Wong with the previous combinations to reject the claims with the newly added element.

However, one skilled in the art would not combine Wong with Kim. In particular:

- Kim teaches operation during a single half-clock cycle; however Wong teaches operation over multiple clock cycles

As can be seen in FIG. 4 of Kim, Kim adjusts the timing of a clock to adjust the skew of output data. The adjusted clock signal mCLK is changed every half-cycle of the clock. The skew is adjusted so that each set of data (0-7) is adjusted by the clock mCLK.

In contrast, Wong operates over multiple clock cycles. Wong describes a phase locked loop (PLL). The phase error information is integrated over N clock cycles. Wong, Abstract. As an example, N is 44. Wong, col. 4, ll. 50-58.

- Wong explicitly teaches against operating on every clock cycle.

Wong describes continuous processing as costly and resulting in undesirable performance. Wong, col. 4, ll. 24-32. As a result, Wong would not be used in a system operating over a single clock cycle.

- Errors would be introduced into Kim by operating over multiple clock cycles

Kim describes the problem of transitions on a bus causing a change in the ground voltage when multiple signals on the bus transition from one state to another. This change in the ground voltage causes a change in the delay of the signal. Kim, ¶4. Thus, it is the currently transitioning signals that cause the change in delay.

If Kim is operated over multiple cycles, multiple sets of parallel data would be used to adjust the delay of a current single set of parallel data. In other words, data from previous cycles that does not affect the delay of the current data would now have an effect. As a result, an incorrect skew adjustment could be introduced. Kim as modified would be compensating for problems caused by transitions that have not happened or have already happened.

- The PLL of Wong is not needed in Kim

PLLs are used for clock and data recovery. The PLL generates a clock matching the frequency and phase of the incoming data. See Wong, col. 2, ll. 62-68. The PLL is needed to generate the clock since the clock is not transmitted with the data.

In contrast, in Kim, clocks are available. There is no need to generate the clock using a PLL. Thus, the PLL of Wong would not be incorporated into Kim.

- Clock skew compensation of Kim is not needed in Wong

Wong operates on individual transitions of the input data, generating pulses PD1 and PD2. These pulses are on the order of half a clock period. See Wong, col. 3, ll. 40-42. Since there is only one set of PD1 and PD2 described for each transition, there is only one transition. As a result, there are not multiple transitions from parallel data.

The compensation of Kim is needed because of multiple transitions. Referring to Table 1 and ¶8 of Kim, it is not the absolute delay of 3.268 ns of one transition that needs to be corrected. In contrast, it is the difference between that delay and a delay from multiple transitions. For example, the 188 ps difference in the 3.456 ns delay for eight transitions is what needs to be compensated, not the absolute 3.456 ns delay.

Accordingly, where there is only serial data and one simultaneous transition, the delay will always be the same. As a result, the skew compensation of Kim is not needed in Wong.

For the above reasons, in particular Wong's effect on Kim and vice versa, one skilled in the art would not combine Wong with the other references.

Conclusion

For the foregoing reasons, reconsideration and allowance of claims 1-15 and 25-26 of the application as amended is requested. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

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Respectfully submitted,

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